Year 9 Science: Electric circuits: charge, current, voltage and resistance

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. A 9 V battery is connected to a 3 Ω resistor. What current flows?

2. In a series circuit an ammeter before the first lamp reads 0.4 A. What does an ammeter after the second lamp read?

3. A parallel circuit has two branches carrying 0.3 A and 0.5 A. What current comes out of the battery?

4. One lamp in a string of three blows. What happens to the other two if the string is in series, and if it is in parallel?

5. A balloon rubbed on hair sticks to the ceiling. Explain why, using the word electrons.

Fix the mistake

6. Correct this statement: "Current gets used up by the first bulb, so less comes out the other side."

7. Correct this statement: "Adding a lamp in parallel makes all the lamps dimmer, just like in series."

8. Correct this statement: "With 6 V across 3 Ω, the current is 6 × 3 = 18 A."

9. Correct this statement: "A rubbed balloon becomes positive because it picks up protons from the jumper."

Answer key (for parents and tutors)

1. A 9 V battery is connected to a 3 Ω resistor. What current flows?
   3 A, because I = V ÷ R = 9 ÷ 3.

2. In a series circuit an ammeter before the first lamp reads 0.4 A. What does an ammeter after the second lamp read?
   0.4 A, because the current is the same everywhere in a series loop.

3. A parallel circuit has two branches carrying 0.3 A and 0.5 A. What current comes out of the battery?
   0.8 A, because branch currents add: 0.3 + 0.5.

4. One lamp in a string of three blows. What happens to the other two if the string is in series, and if it is in parallel?
   In series both go out, because the only path is broken. In parallel both stay lit, because each has its own path.

5. A balloon rubbed on hair sticks to the ceiling. Explain why, using the word electrons.
   Rubbing moves electrons from the hair onto the balloon, so the balloon becomes negatively charged. Its charge pulls on the opposite charges in the ceiling surface, and the attraction holds it up.

6. Correct this statement: "Current gets used up by the first bulb, so less comes out the other side."
   Current is the same all the way round a series loop; the bulbs take energy from the charge, not the charge itself.

7. Correct this statement: "Adding a lamp in parallel makes all the lamps dimmer, just like in series."
   Each parallel branch still gets the full battery voltage, so every lamp stays as bright; the battery just supplies more current and goes flat sooner.

8. Correct this statement: "With 6 V across 3 Ω, the current is 6 × 3 = 18 A."
   Rearrange V = IR to I = V ÷ R, so the current is 6 ÷ 3 = 2 A; more resistance means less current, not more.

9. Correct this statement: "A rubbed balloon becomes positive because it picks up protons from the jumper."
   Only electrons move when you rub; the balloon gains electrons and becomes negative, leaving the jumper positive.